

## QUARTERLY PERISCOPE.

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### FOREIGN INTELLIGENCE.

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#### ANATOMY.

1. *Observations on the Structure of the Brain.*—The *Annalen der Physik und Chemie* von Poggendorff, No. 7, 1833, contains an essay by Professor EHRENBERG, of Berlin, entitled, "The necessity of a minute mechanical examination of the brain and nerves in preference to the chemical analysis illustrated by observations," in which there is given an account of some observations recently made by him with regard to the minute structure of nervous tissue, as seen by the aid of a very powerful microscope.

Many attempts of a similar nature to examine the structure of that fibrous-like texture which is in general seen in some parts of a fresh brain, and which becomes more obvious when the brain has been artificially hardened by steeping in alcohol or a solution of the muriate of mercury, or by boiling in oil, have been made ever since the microscope came into use, but these attempts have led as yet to very unsatisfactory results.

A hasty repetition of Professor Ehrenberg's observations has not shown us the appearances described by him, but the well merited character for accuracy and skilfulness in the use of the microscope which that observer has acquired by his interesting researches on the structure and functions of Infusoria, makes us hope that they may be found to be correct, and satisfies us that a short account of them will at all events be interesting to anatomists and physiologists.

The discordance in the accounts given of the structure of the brain and nerves by Leewenhoek, Della Torre, Monro, Bauer, Home, and others, and the unsuccess which has generally attended this investigation, may in some degree have proceeded from unskilful management of the microscope on the part of some—from different modes of examination having been adopted by others—from a total ignorance with regard to the disposition of the elementary texture in which the nervous matter of the brain has been generally believed to be contained—from the supposition that has prevailed that a fluid or mucous matter might constitute the matrix in which the nervous filaments are deposited—and from the circumstance that fibres of very different magnitude have been looked for in the nervous texture by different observers.

Professor Ehrenberg has shown that the proper nervous substance of the brain and nerves does actually consist of very minute fibres; and he informs us that these fibres can only be discovered by the aid of a magnifying power of three hundred diameters, and that he was sometimes obliged to have recourse to a much greater magnifying power, as eight hundred diameters, in order to bring them into view. He examined thin slices of the recent brain, and states that the fibrous structure was in general most obvious at the thin margins of the

slices, when these were simply laid on the object glass-holder of the microscope, and that gentle pressure of the nervous substance between two thin plates of glass generally rendered the fibres more apparent.

The great mass of the cerebrum and cerebellum consists, according to professor Ehrenberg, of very minute fibres irregularly disposed in the cortical part, and there interspersed with globules and plates, converging as they pass inwards from the surface towards the centre of the brain. The greater number of these fibres have not a regular cylindrical shape, but present the appearance of strings of pearls, the swelled portions being situated at some distance from one another, and united by narrower parts which are continuous with them, and are formed apparently of the same material. Besides these fibres, which professor Ehrenberg calls *articulated*, from their knotted appearance, this observer states that towards the base of the brain and crura cerebri, other somewhat larger fibres, of a regular cylindrical form, are to be observed, interspersed among the articulated or knotted ones. These two sets of fibres are not held together by cellular tissue, nor fluid, nor mucous matter, but appear to be nearly in juxtaposition with one another, except where they are penetrated by the net-work of minute blood-vessels which are every where distributed through the brain. The cortical substance seems, according to Ehrenberg's observations, to differ from the medullary or white substance chiefly in the want of the straight cylindrical fibres, and in the articulated fibres being contained in a denser net-work of blood vessels, and being covered by a layer of free granules larger than the dilated parts of the knotted fibres.

In the brain, the fibres run for the most part parallel to one another; they are sometimes seen to cross, and, in a few instances, professor Ehrenberg states that he has observed two fibres uniting into one, but never any distinct anastomosis.

The larger straight cylindrical fibres, he states, are manifestly tubular, because it is possible to see the inner parietes of the tube, and on dividing some of these fibres and gently pressing them between plates of glass, a granular medullary matter was made to issue from them. In the knotted or articulated fibres he never was able to discover a distinctly tubular appearance, nor could any matter be pressed from their interior; but notwithstanding this, Ehrenberg considers these also as tubular.

Professor Ehrenberg has observed a remarkable difference in the minute structure of some of the nerves of special sensation, the great sympathetic nerve, and the compound spinal nerves. He finds that the olfactory, the optic, and the auditory nerves, as well as the branches of the great sympathetic, are entirely composed of knotted or articulated fibres, similar in size and appearance to those forming the great bulk of the nervous matter in the cerebrum: while the nerves of motion and the regular spinal nerves, are entirely composed of the straight cylindrical tubular fibres.

The cylindrical tubular fibres of the spinal nerves and of the nerves of motion coming from the brain, are considered by professor Ehrenberg as prolongations of some of the articulated fibres of the brain itself, for he has observed at the origin of a nerve of motion, that the articulated fibres gradually lose their knotted appearance as they pass into the root of the nerve, and increasing slightly in diameter, become the straight tubular cylindrical fibres proper to nerves of this description.

The net-work of the retina affords an excellent opportunity of viewing the articulated cerebral fibres, but in order that these may be well seen, there must be removed from their surface, a layer of coarse granules, nearly of the diameter of the nuclei of the blood globules, and similar to those which cover the flattened extremities of the articulated fibres, at the surface of the cortical substance of the brain.

It remains still to be investigated, whether the knotted kind of fibres are only to be found in the nerves above mentioned, or are peculiar to all sensory nerves, while the cylindrical tubular fibres are peculiar to motory nerves.

Both the cylindrical and the articulated fibres, as they pass from the brain into the roots of the nerves, receive a nervous covering or neurilemma, which invests each individual fibre, and each bundle of fibres, as well as the whole trunk of the nerve, with a dense cellular and vascular coat.

The cylindrical fibres are stated to be about 1-120 of a line in diameter.

It must not be supposed, that professor Ehrenberg has confounded the tubular appearance of the nervous fibre with that of the neurilemma, for he professes to have accurately distinguished the limits of both these parts.

The ganglia are described by professor Ehrenberg as somewhat resembling the brain, in respect to the nature of the fibres composing their nervous substance. They are formed by reticulated collections of both articulated and cylindrical fibres, interspersed with granules and cellular texture. In some places in the ganglia, he has also remarked a greater than ordinary enlargement of the swellings of the articulated fibres.

These observations have been made on the human brain and on that of some quadrupeds, of birds and reptiles, with nearly the same results in all.—*Edinburgh New Philos. Journ. July, 1834.*

2. *Abstract of Observations on the Structure and Functions of the Nervous System.* By JAMES MACARTNEY, M. D. Professor of Anatomy and Surgery in the University of Dublin.—The author begins by stating the received opinion respecting the structure of the brain, as consisting of two substances; the one an opaque white pulp, which is considered to be the nervous matter; the other a coloured substance, in some places inclosing the white, and at other places being imbedded in it.

It has been long known, he adds, that the white substance in many parts assumes the shape of bands or bundles of fibres. Dr. Spurzheim did not hesitate to call these fibres nerves, and was more successful in tracing their course in some parts of the brain than his predecessors had been.

But the author has employed a method of dissecting the brain, which has enabled him to discover that all our former ideas with respect to the structure of the cerebral organ fall far short of the intricacy with which its several parts are combined.

In order to perceive the real structure of the brain, recent specimens are necessary. The sight should be aided by spectacles of a very high magnifying power; and as the different parts are exposed in the dissection, they should be wetted with a solution of alum in water, or some other coagulating fluid. By these means it will be observed that all the white substance, whether appearing in the form of bands, cords, or filaments, or simply pulp, are composed of still finer fibres, which have a plexiform arrangement, and that all those fibres, to the finest that can be seen, are sustained and clothed by a most delicate membrane. By the same mode of dissection, also, it is possible to make apparent the existence of still finer interwoven white fibres in all the coloured substances of the brain, in many of which the nervous filaments are so delicate and transparent that they are not visible until in some degree coagulated by the solution of alum or by spirits.

Dr. Macartney has thus been enabled to see twenty-six plexuses not hitherto described in the brain, the fibres composing which assume two arrangements, the one reticular, the other arborescent.

The membrane mentioned as pervading the entire substance of the brain, and supporting its delicate organization in every part, has heretofore escaped the observation of anatomists, and yet when the fact is declared, we at once perceive that such a membrane must exist. It cannot be supposed that a mass of the magnitude of the brain, and possessing so definite an organization, should form an exception to the fabric of all the other parts of the body, and be left unprovided with a membranous support. This membrane is analogous to the cellular membrane; and if we admit that the filaments of the brain are similar to the fibres in other parts of the nervous system, we may consider the mem-